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SPECIATION, AVAILABILITY, AND BIO-ACCUMULATION OF MERCURY IN LAKES

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SPECIATION, AVAILABILITY, AND BIO-ACCUMULATION OF MERCURY IN LAKES. T. A. Jackson, National Hydrology Research Institute, Saskatoon, Saskatchewan.

In northern Manitoba, enlargement of riverine lakes to form reservoirs has caused a rise in the mercury content of fish owing to stimulation of microbial methylation of background Hg by organic matter on flooded land. However, the dependence of Hg levels in organisms on ambient CH_3Hg^+ level and extent of flooding becomes progressively weaker toward the lower end of the food chain, implying bio-magnification of CH_3Hg^+ up the food chain. Even at the same trophic level different organisms show different regional and temporal variations in Hg content, reflecting interaction of biological factors such as diet, behaviour, and Hg excretion mechanisms with environmental factors. Hg in plankton and benthic invertebrates is probably in large part inorganic, and Hg uptake by these organisms appears to be controlled by Hg-binding agents (organic matter, sulfides, Fe and Mn oxides, and clay) which restrict Hg availability; preferential effects of particular Hg-binding agents on particular kinds of benthic animal are also suggested. Hg in walleye, a predatory fish at the top of the food chain, shows the strongest dependence on ambient CH_3Hg^+ and correlates with certain empirical compound variables representing the combined effect of the bioassay-determined methylation rate and analytically-estimated abundance of available inorganic Hg in sediments. Such parameters may be widely applicable and useful in the assessment and prediction of the environmental impact of Hg.